Appendix C
Decommissioning and rehabilitation strategy

Queensland Hydro

Prepared for the Borumba PHES Project

Borumba Pumped Hydro Energy Storage Project – Exploratory Works Decommissioning and Rehabilitation Strategy

DOCUMENT NUMBER BR-NA-NON-EMG-PLN-00004

OCTOBER 2025

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Acknowledgement of Country

In the spirit of reconciliation, Queensland Hydro acknowledges the Traditional Custodians of Country throughout Queensland and, in particular the lands, skies and waters on which we operate. We celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to the lands, skies and waters of Queensland.

Queensland Hydro pays respect to Elders past and present honouring their continuing spiritual and cultural connections to Country.

1. Introduction

1.1 Background

The Borumba Pumped Hydro Energy Storage (PHES) Project (the Borumba PHES Project) being undertaken by Queensland Hydro requires the completion of Exploratory Works (the Exploratory Works Project) to confirm the suitability of the Borumba PHES Project location and design. The Exploratory Works Project includes the necessary geological investigations, supporting infrastructure, and activities to inform the development of the separate and related Borumba PHES Project Main Works.

Queensland Hydro was established by the Queensland Government in September 2022 to plan, deliver, own, operate and maintain the Borumba PHES Project. The Borumba PHES Project is located within the Gympie and Somerset Regional Council local government areas, approximately 13 kilometres (km) southwest of the township of Imbil, 48 km southwest of Gympie, and 180 km northwest of Brisbane.

Much of the Exploratory Works would be located, unavoidably, in vegetated areas that provide habitat for listed threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and as such the Exploratory Works Project is a controlled action under the EPBC Act.

1.2 Purpose

The purpose of this Decommissioning and Rehabilitation Strategy is to provide a framework for the decommissioning and rehabilitation of elements (detailed in Section 3) associated with the early investigative phase of the Borumba PHES Project. These works are referred to as the Exploratory Works and are subject to the requirements of approval conditions under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Queensland *Nature Conservation Act 1992* (NC Act), as well as other state legislation (detailed in Table 1).

This Decommissioning and Rehabilitation Strategy applies to the Exploratory Works that are the subject of the controlled action (EPBC 2023/09461). It may also be used to apply to activities that are excluded from the action and those being undertaken through a Works Regulation under the *State Development and Public Works Organisation Act 1971* (described in Table 1).

1.3 Scope

This Decommissioning and Rehabilitation Strategy has been prepared to provide a framework for the potential development of a future detailed Decommissioning and Rehabilitation Plan for the Exploratory Works Project.

The need for - and level of detail of - the future plan is currently unknown, as the point at which decommissioning may be triggered would be driven by cancellation of the Borumba PHES Project, which may or may not occur.

Similarly, the scope of the rehabilitation works would not be known until there is a determination on whether the Borumba PHES Project will proceed or not. The scope of rehabilitation required would be driven by the amount of Exploratory Works completed at the time of Borumba PHES Project cancellation.

The Decommissioning and Rehabilitation Strategy takes the precautionary approach of assuming the worst-case scenario, that is, that the Exploratory Works were near or at completion at the time of Borumba PHES Project cancellation.

It should be noted that a number of elements of the Exploratory Works are considered temporary in nature and may be decommissioned regardless of whether the Borumba PHES Project Main Works proceed or not (e.g. temporary water infrastructure). The need to decommission these temporary elements will be driven by project requirements, assuming the Main Works proceed, and opportunities for reuse.

This strategy does not specifically address all activities excluded from the controlled action. The strategy may be updated, or a specific rehabilitation plan developed, for excluded activities not currently addressed subject to project requirement (as noted above). The strategy does not apply to activities that will be undertaken by other parties such as local councils.

1.4 Relevant legislation

The Acts and Guidelines set out in Table 1 are relevant to the proposed Exploratory Works, as they either trigger the need for this Decommissioning and Rehabilitation Strategy to be developed, or they provide approval conditions that need to be complied with in relation to decommissioning and rehabilitation of the Exploratory Works.

Table 1: Relevant legislation

Act or guideline	Relevance of Act or guideline
Environment Protection and Biodiversity Conservation Act 1999 **(EPBC Act)**	The EPBC Act regulates impacts on matters of national environmental significance (MNES), in addition to other matters relevant to Commonwealth land and marine species. The majority of the Exploratory Works activities were referred to the Commonwealth for assessment under the EPBC Act, for potential impacts on MNES. The Exploratory Works were declared a controlled action, with approval for the works to be based on assessment through preliminary documentation. Development of this Decommissioning and Rehabilitation Strategy was requested by the Commonwealth as part of the additional information required, and forms part of the Exploratory Works Project's preliminary documentation.
Environmental Protection Act 1994 (Qld) **(EP Act)**	The object of this Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development)." Environmental harm is "any adverse effect" on an environmental value or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency). The source or type of harm is irrelevant. Environmental harm is, therefore, not limited to pollution or the release of contaminants, but includes all forms of harm to environmental values such as land clearing and soil erosion. The EP Act can, therefore, potentially regulate any activity impacting on the environment. The purpose of the Decommissioning and Rehabilitation Strategy is to ensure that post-Exploratory Works Project activities are not conducted in a manner that would result in environmental harm, and that Queensland Hydro and its staff comply with the general environmental duty.
Nature Conservation Act 1992 **(Qld)** **(NC Act)**	A framework is established by the NC Act for the creation and management of protected areas (such as national parks) and the protection of native flora and fauna (protected wildlife). Some of the works involved in the Exploratory Works will involve geotechnical investigations within the Conondale Resources Reserve, which adjoins Conondale National Park and administered under the NC Act. Any works within the resources reserve will need to be undertaken under an authority issued by the Department of Environment, Tourism, Science and Innovation (DETSI) through the Queensland Parks and Wildlife Service (QPWS). As part of this authority, any disturbance associated with the proposed works will need to be rehabilitated in accordance with the Environmental Management Plan submitted to and approved by QPWS.
Planning Act 2016 **(Qld)** **(Planning Act)**	The Planning Act is Queensland's principal planning legislation. The Act's overarching purpose is to establish an efficient, effective, transparent, integrated, coordinated, and accountable system of land use planning (planning), development assessment and related matters that facilitates the achievement of ecological sustainability. The potential exists for Exploratory Works Project elements to require development approval that falls within the framework of the Planning Act. Where a development approval is granted for the Exploratory Works it may contain conditions that require decommissioning or rehabilitation, which would be included in a future detailed Decommissioning and Rehabilitation Plan.

Act or guideline	Relevance of Act or guideline
***State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act)**	Under the SDPWO Act, a regulation may be made that directs a local body and/or the Coordinator-General to undertake works. Works relating to the establishment of two temporary workers' accommodation camps (not part of the controlled action) for the Exploratory Works Project and for geotechnical works and associated investigations have been approved under such regulations. Reserved works, relating to upgrades to Bella Creek Road, Borgan Road, Yielo Road and Sunday Creek Road, will also be supported by the Coordinator-General under this legislation. Given these works will facilitate the upgrade of council-controlled roads, decommissioning and rehabilitation of these roads is not proposed.

1.5 Exploratory Works

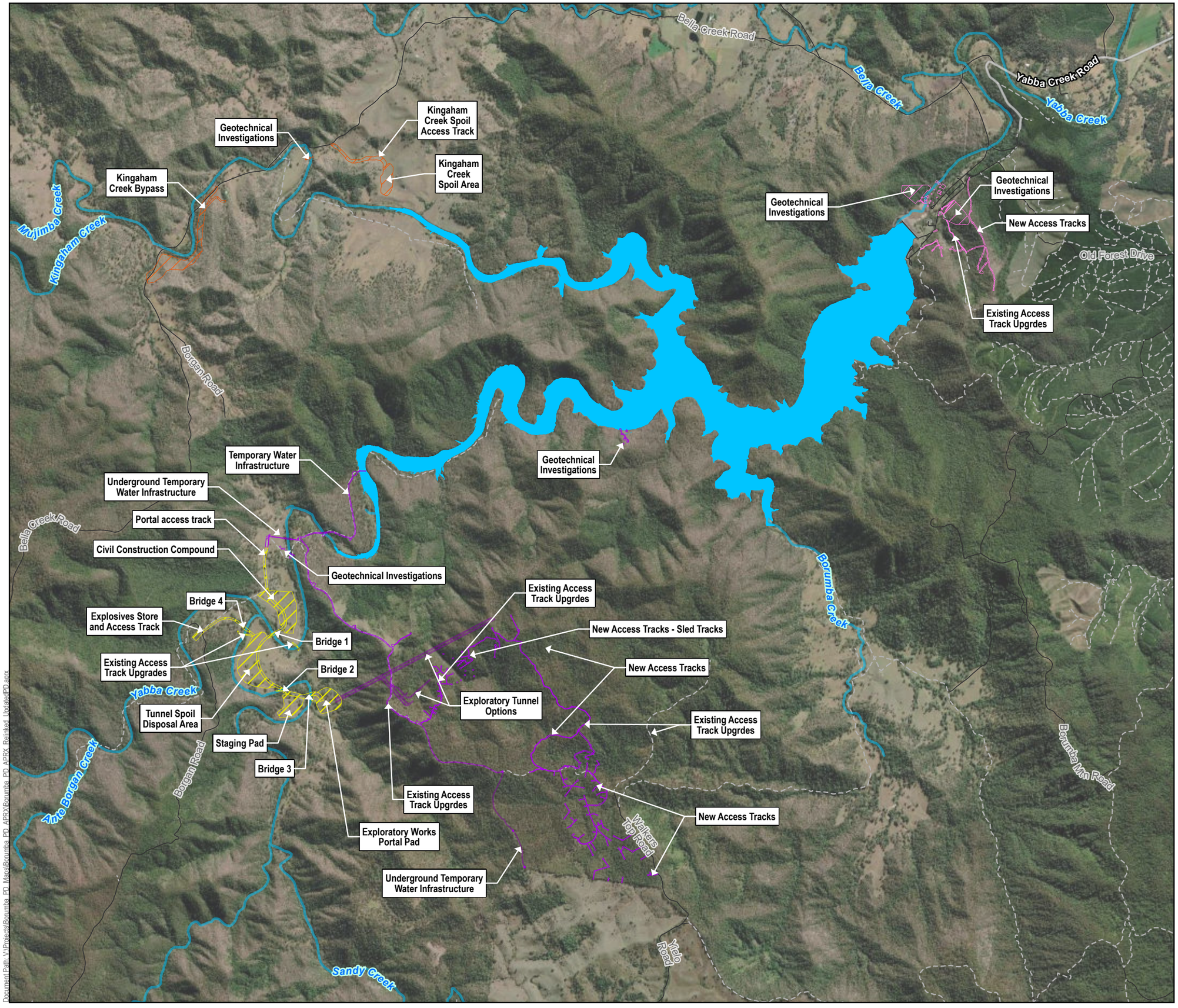
The Exploratory Works Project controlled action (EPBC 2023/09461) comprises technical investigations for a proposed future pumped hydro energy storage facility. It is solely focused on these technical investigations and includes the following activities:

- Geotechnical investigations – comprising test pits, boreholes (deep and shallow, including some conversion to groundwater monitoring bores), and geophysics.
- Spoil disposal – two dedicated areas (tunnel spoil disposal area and Kingaham spoil disposal area) for the storage and management of excess material from exploratory tunnelling, construction of the Kingaham Creek bypass (see below), and other Exploratory Works activities, as well as stockpiling of stripped topsoil as required.
- Site access – activities associated with:
  - construction of new access tracks and upgrades to existing tracks, including waterway crossings, to enable access to geotechnical investigation sites, spoil disposal areas, and supporting infrastructure.
  - the realignment of a section of Bella Creek Road, referred to as the Kingaham Creek bypass.
- Other supporting infrastructure – establishment of temporary water infrastructure and a civil construction compound.
- Exploratory tunnel infrastructure – comprising dual exploratory tunnels, a portal pad and access track, staging pad, water management infrastructure, explosive store and access track.

The location and footprint of the Exploratory Works Project is illustrated in Figure 1.

A detailed description of the Exploratory Works elements, and decommissioning methods for each, is provided in Section 3.

Activities that are not included in the EPBC controlled action, but that are subject to other approvals may be subject to decommissioning.



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Queensland Hydro

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LEGEND

- Watercourses
- Local Roads
- Tracks
- State Controlled Roads
- Lake Borumba (FSL 135.01m AHD)

Exploratory Works Project

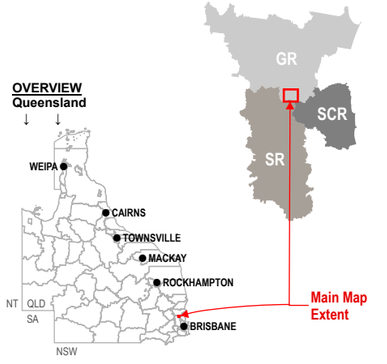
Project Footprint by Work Area

- Area 1 - Borumba Dam
- Area 2 - Kingaham Creek
- Area 3 - Walkers Top
- Area 4 - Borgan

Project Component - Underground

- Area 3 - Walkers Top

OVERVIEW
Gympie Regional, Somerset Regional, Sunshine Coast Regional



Data Sources:

1. State controlled roads - Queensland © State of Queensland (Department of Transport and Main Roads) 2020
2. Site Layout Items @ SMEC/ GHD / AFRY, 2022-2023
3. Watercourses © State of Queensland (Department of Natural Resources, Mines and Energy) 2022
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Exploratory Works Project
Preliminary Documentation

EXPLORATORY WORKS FOOTPRINT

PROJECT #:	30032677/30032772
CREATED BY:	BM
LAST MODIFIED:	NC17428, 29/09/2025
REVISION:	A

FIGURE 1

1.6 Exploratory Works timeline

Currently, the full scope of the Exploratory Works Project is planned to be staged over a period of approximately 51 months, from early 2026 to mid 2030. At that point it is anticipated that the Main Works for the delivery of the Borumba PHES Project would commence. The current proposed schedule for the Exploratory Works is outlined in Table 2.

Table 2: Anticipated Exploratory Works Project Schedule

Project components	Time period within which works are anticipated to occur		Life of component^	Anticipated timing and duration of associated clearing
	Start date	End date		
Geotechnical investigations				
All areas	Mar 2026	Oct 2027	16 months	Clearing will occur progressively, with each investigation site cleared before drilling/excavation and after an access track is established. Sites will be stabilised and where applicable rehabilitated once the investigation at that site is complete. Geotechnical investigations at Kingaham Creek will be undertaken within the footprint of proposed infrastructure.
Spoil disposal				
Kingaham Creek spoil disposal area	Jan 2027	Dec 2027	Permanent	Clearing for the spoil area will take approximately six months within this 12 month period.
Tunnel spoil disposal area	Jan 2027	Jun 2030	Permanent	Clearing will be completed in less than two weeks and take place within this 12 month period.
Site access				
Kingaham Creek bypass	Jan 2027	Dec 2027	Permanent	Clearing will be completed in less than two weeks and take place within this 12 month period.
Construction of new and upgrade to existing access tracks at Borumba Dam to service geotechnical investigations	Mar 2026	Aug 2027	10-16 months (some permanent) *	Construction of new access tracks and existing track upgrades will occur in stages. Tracks will be rehabilitated progressively, once geotechnical investigations are completed the track may be decommissioned.
Construction of new and upgrade existing access tracks at Walkers Top to service geotechnical investigations	Mar 2026	Aug 2027	10-16 months (some permanent) *	Construction of new access tracks and existing track upgrades will occur in stages. Tracks will be rehabilitated progressively, once geotechnical investigations are completed the track may be decommissioned.
Other supporting infrastructure				
Temporary water infrastructure	Mar 2026	Dec 2029	24 months	Clearing for each component will be completed in less than two weeks.
Civil construction compound	Mar 2026	Feb 2029	24 months	Construction to be staged, with clearing for each section as required and undertaken over 24 months within this 36 month period.

Project components	Time period within which works are anticipated to occur		Life of component^	Anticipated timing and duration of associated clearing
	Start date	End date		
Exploratory tunnel and supporting infrastructure				
Explosive store	Jun 2027	Jun 2030	24 months	Construction will occur over two months within this 36 month period, with clearing expected to be completed in less than four weeks.
Portal pad and staging area, portal access track	Jul 2027	Jun 2030	22 months	Construction will occur over four months within this 36 month period, with clearing expected to be completed in less than four weeks.
Tunnelling works#	Jul 2027	Jun 2030	Permanent	Tunnelling works will be underground and take 12-18 months. Clearing associated with tunnelling will occur during construction of the portal pad. Tunnelling would commence after the explosive store and portal pad, staging area and portal access track are complete.

^ If the Borumba PHES Project Main Works do not proceed.
* Where the Borumba PHES Project Main Works do not proceed. some access tracks may be retained for site maintenance, while others will be left to revegetate.
# Where the Borumba PHES Project Main Works do not proceed, the tunnels will be sealed, but will remain in place.

1.7 Environmental management

The overall approach to environmental management for the Exploratory Works Project is described in the Construction Environmental Management Plan (CEMP). The CEMP provides a framework for a comprehensive, integrated approach to environmental management during implementation of the Exploratory Works.

The Decommissioning and Rehabilitation Strategy forms part of Queensland Hydro's environmental framework as described in the CEMP. It has been prepared for the Exploratory Works and does not apply to the Main Works phase of the Borumba PHES Project.

2. Consultation

2.1 Consultation prior to decommissioning

Where the Borumba PHES Project does not to proceed, extensive consultation between Queensland Hydro and a range of government agencies and stakeholders will be required, including in relation to the ownership of Queensland Hydro land needed for the project.

2.1.1 Consultation with government agencies

If there is a decision not to proceed with the Borumba PHES Project, it is anticipated that consultation with the following agencies would be required to confirm the Exploratory Works Project status and align expectations regarding decommissioning and rehabilitation:

- Department of Climate Change, Energy, the Environment and Water (DCCEEW)
- Office of the Coordinator-General (OCG)
- Department of Tourism Environment, Science and Innovation (DETSI)
- Department of Primary Industries (DPI)
- Queensland Treasury (QT).

2.1.2 Consultation with Queensland Parks and Wildlife Service

Some of the works comprising the Exploratory Works Project will involve geotechnical investigations in the Conondale Resources Reserve, which is administered under the NC Act, and Imbil State Forest, which is administered under the *Forestry Act 1959*.

Any works within the resources reserve or state forest will need to be undertaken under an authority issued by DETSI through the QPWS. As part of this authority, any disturbance associated with the proposed works will need to be rehabilitated in accordance with an Environmental Management Plan submitted to and approved by QPWS.

Some aspects of the proposed work such as tracks to and within the resources reserve and/or state forest may be of future use to QPWS for management purposes. Consultation with QPWS on the potential for beneficial retention of some Exploratory Works Project elements would need to be undertaken.

3. Decommissioning methods for Exploratory Works components

The following sections provide a summary of the decommissioning methods that will be undertaken for each works element associated with the Exploratory Works.

3.1 Exploratory Tunnel Infrastructure (including portal pad)

Aspect	Details
Purpose	To obtain geotechnical information on the conditions for the proposed underground Powerhouse Cavern and access tunnels and gain access to the exploratory tunnels.
Type/size	The dual exploratory tunnels are up to 2.0 km long with a 32 m^2 finished face surface area for each tunnel. This has been amended from the previous single tunnel with a 70 m^2 face area. The tunnels are approximately 5.5 m wide and 6.0 m high. The exploratory tunnels require the preparation of a "portal" area. This is a level above ground working area that provides the starting point for tunnelling, access to the tunnels, movement area for vehicles and equipment, space for material transfer and handling, short-term storage of materials needed to facilitate the tunnelling works and temporary water storage pond and water filtration equipment. The portal pad will comprise an approximately 100 m x 120 m flat pad plus a temporary water storage area or sediment basin. However, as the pad is in steep terrain, the disturbance area (encompassing the cut batters) will be larger than the final pad size.
Location	The exploratory tunnels are located west of Walkers Top Road and east of Sandy Creek, with orientation from north-east to south-west. The portal pad will be located at the entrance to the tunnels.
Installation	The exploratory tunnel drilling will begin at the portal pad and will comprise diamond drilling along the proposed alignment using specialised diamond drill rigs, and excavation of the exploratory tunnels using conventional underground mining equipment for drilling and blasting. The tunnelling contractor will conduct diamond drilling in advance of the tunnel excavation to obtain information on the geotechnical conditions to be encountered, enabling design of the tunnel support structure and ground water management. Ground support in the tunnels will comprise a mixture of shotcrete, rock bolts, spiling bars and lattice girders. The portal working area will be created through "cut and fill" excavation of the slope where the tunnel entrance would commence to create a level working pad. As the excavation for the portal pad increases in depth, the near-to-vertical face where the tunnel entrances (portals) are to be located will be supported by a grid of shotcrete and rock bolts. Compacted gravel will be placed on the surface of the portal pad to provide all weather access.
Operation	The contractor will be responsible for safe operation within the tunnels and around the portal. The portal pad will operate 24 hours a day, seven days a week for the duration of the exploratory tunnelling operations.
Decommissioning and rehabilitation	In the event that the Borumba PHES Project does not proceed, the exploratory tunnel entrances (the portal) will be sealed with a reinforced concrete 'plug' prior to the portal pad being backfilled. Back filling of the portal pad area will be undertaken to return the excavated area to as close to the pre-disturbance landform as possible. Once backfilled and returned to a pre-disturbance landform, the area would be stabilised to minimise erosion and sedimentation in accordance with the best practice measures identified in *Best Practice Erosion and Sediment Control* (IECA, 2008) Revegetation of the area back to a pre-disturbance land use status (i.e. grazing) would be undertaken. Revegetation would follow the processes outlined in Section 4.

3.2 Staging pad, civil construction compound and portal access track

Aspect	Details
Purpose	A temporary access track is required to facilitate movement to and from the exploratory tunnel portal pad. This track will also provide access to the staging pad and civil construction compound. A staging area will be established to allow short to medium term storage of materials required for the development of the exploratory tunnels as well as site facilities infrastructure. A civil construction compound is needed to provide workforce facilities and a laydown area for materials required for civil construction works, and for temporary water tank farm 1.
Type/size	The staging pad is a level above ground working area that supports the underground exploratory tunnelling operation by providing movement area for vehicles and equipment, space for material transfer and handling, and short term to medium term storage of materials needed to facilitate the tunnelling works. Some minor temporary site facilities may also be located here, in addition to water treatment basins. The portal access track will be required to access the staging area. The staging pad will comprise an approximately 150 m x 195 m flat pad plus three water storage tanks (approximately 60 m diameter by 3 m tall, 18 ML volume capacity), in an area that is largely flat and cleared, with a setback distance of 50 m from Sandy Creek. The civil construction compound will comprise a flat pad and be located in an area that is largely cleared and setback 50 m from Yabba Creek. The terrain at the pad location is relatively flat, so the disturbance footprint for construction will be only slightly larger than the pad.
Location	The portal access track connects the portal pad to Borgan Road via the tunnel spoil disposal area (Section 0). It also includes several waterway crossings that are addressed in Section 3.4. The staging pad is proposed to be located adjacent to the portal access track, near the portal pad. This is west of the exploratory tunnels, which is to the west of Walkers Top Road and east of Sandy Creek. The location is illustrated in Figure 1. It will be setback a minimum distance of 50 m from Sandy Creek. The civil construction compound is located to the north and west of Yabba Creek and between Borgan Road and Walkers Top Road. It has a setback distance of 50 m from Yabba Creek on all sides.
Installation	The staging area will be created through “cut and fill” excavation of the slope where the tunnel entrance would commence (the portal pad) to create a level working pad. The establishment of the staging area will require minor clearing of non-remnant vegetation and earthworks to establish a safe, level working area. The location nominated for the staging area has been selected to minimise the amount of clearing and earthworks required. Clearing will be undertaken in accordance with the protocols included in the Exploratory Works Project’s Flora and Fauna Management Sub-plan and the Construction Environmental Management Plan. The portal access track will be an unsealed gravel access road constructed from Borgan Road north of Yabba Creek to the portal pad. Fill material for the civil construction compound will likely be sourced from construction of the portal pad and other civil works. Material (consisting of rock and material ‘other than rock’) will be delivered by dump truck (either articulated dump trucks or rigid body trucks), spread by dozer and placed by compactor. Compacted gravel will be placed to provide all weather access. A fauna exclusion fence will be installed around the perimeter.
Operation	The contractor will be responsible for safe operation of works within and around the staging portal.

	Demountable facilities for the civil workforce will be installed on the civil construction compound, including offices for management staff, workforce crib facilities and ablutions.
Decommissioning and rehabilitation	In the event that the Borumba PHES Project does not proceed, the staging pad, civil construction compound and portal access track would be decommissioned and rehabilitated. Gravel surfacing will be scraped back and taken offsite or reused if a suitable beneficial reuse option is identified. Reshaping and back filling of the staging area and civil construction compound will be undertaken to return the areas to as close to the pre-disturbance landform as possible. The track would remain in place to allow access for the decommissioning works and would be removed once rehabilitation of the main staging area is complete. Once backfilled and returned to a pre-disturbance landform the area would be stabilised to minimise erosion and sedimentation in accordance with the best practice measures identified in *Best Practice Erosion and Sediment Control* (IECA, 2008). Revegetation of the area back to a pre-disturbance land use status (i.e. grazing pasture) would be undertaken. Revegetation would follow the processes outlined in Section 4.

3.3 Geotechnical investigation areas and access tracks and Kingaham Creek bypass

Heading	Details
Purpose	To undertake geotechnical investigations and facilitate access to investigation sites for drill rigs, crew and support vehicles. To provide access to the Project site.
Type/size	Approximately 14 km of new tracks would be constructed to facilitate movement of geotechnical equipment. These tracks would allow geotechnical vehicles to safely access the proposed locations of key geotechnical investigation sites. The design criteria for these new tracks are: • 4 m wide single traffic lane • 6 m cleared width (traffic lane + 1 m each side) • maximum vertical grade of 25% • gravel sheeting 4 m x 250 mm thick where vertical grade of the track alignment is 10% to 25% or in areas found to be slippery when wet • un-sheeted (natural ground) where the vertical grade of the track alignment is 0% (flat) to 10% grade. Additionally, access track upgrades are required to approximately 5 km of existing unsealed tracks. Geotechnical drilling pads will be established at the location of geotechnical boreholes, with the size limited where possible but dictated by the ground conditions and terrain. Kingaham Creek bypass is a 1.4 km realignment of Bella Creek Road proposed to provide access for the Exploratory Works that meets the required flood immunity.
Location	The access tracks and work areas are distributed across the Exploratory Works footprint and in many cases align with existing tracks, which will also be upgraded to facilitate access. The Kingaham Creek bypass extends south of the existing Bella Creek Road and Kingaham Creek, through lot 64LX2110.
Installation	It is expected that the access track works would use plant appropriate for the terrain (e.g. dozer with excavator, articulated dump truck and padfoot roller). The track alignment would be finalised on site based on the required grading and minimising the amount of vegetation clearing (i.e. avoiding large trees where possible and following terrain contours). Vegetation and spoil will be stockpiled along the edge of the tracks

Heading	Details
	for future use or transported to the spoil disposal area. Gravel would be delivered by single axle body truck, spread by dozer and track-rolled only. The construction of the Kingaham Creek bypass will be predominately in cut material. The construction process will require clearing and grubbing, vegetation and topsoil removal from the proposed road alignment. Controlled blasting used in rocky areas as needed. Material will be stockpiled at the Kingaham Creek spoil area. Bulk earthworks will be carried out using suitable machinery based on the outcomes of site geotechnical investigations. Drainage systems will be installed to manage water flow and prevent erosion, with ditches and culverts used to collect surface runoff. The road subgrade will be prepared through compaction to achieve the required density, and stabilisation techniques applied as necessary. Road design is expected to include an aggregate base compacted to create a stable foundation for the pavement, with quality control measures in place to ensure compliance with specifications. The road surface will then be constructed using asphalt or concrete, in accordance with the detailed road design, Austroads road design guidelines, and Australian Standards. Additional supporting infrastructure for the bypass, such as retaining walls for slope stability, will be determined if required based on the results of the geotechnical investigations. Road safety features, including guardrails and signage, will be installed according to Austroads road design guidelines. Finally, road batter slopes will be revegetated as required to enhance stability and prevent erosion.
Decommissioning and rehabilitation	Only those tracks and geotechnical work areas that would not be reused (e.g. for property access and maintenance) will be rehabilitated. Test pits will be backfilled as soon as possible in compacted layers, with the excavated spoil placed in reverse order to match the in-situ strata as best as practicable. Backfill material will be tamped down using the excavator bucket and then tracked over. Boreholes will be filled with cement grout. The soil profile will be reinstated, allowing the seed bank in the topsoil to naturally revegetate the site. Upgraded access tracks that form part of the existing access tracks would still be utilised by leaseholders in the event Borumba PHES Project does not proceed. Consequently no decommissioning or rehabilitation of these existing tracks, other than stabilisation to control erosion, is proposed. Tracks and drilling pads that are no longer required will be reshaped to pre-disturbance landforms, stabilised to prevent erosion and rehabilitated through revegetation. If the Main Works do not proceed, Kingaham Creek Bypass will remain in place and provide improved flood immunity for the local road network.

3.4 Creek crossings

3.4.1 Yabba Creek bridge (portal access track)

Aspect	Details
Purpose	To enable heavy and long vehicle access to the exploratory drilling portal.
Type/size	There is a single crossing of Yabba Creek along the access road to the exploratory portal. A bridge will be installed to retain access to the exploratory portal during high flow events. Features of the bridge are expected to include: • multi span Bailey bridge (approximately 110 m long in total) • steel and concrete substructure (foundations) • steel superstructure • single lane, 4.5 m between kerbs • AS5100 design standard.
Location	The location of the Yabba Creek vehicle crossing is within lot 3LX2754, lot 1723L37994 and unallocated state land associated with Yabba Creek.

Aspect	Details
	The underside of the bridge superstructure has been set above the 1 in 100 flood level.
Installation	The bridge foundations will be positioned to minimise works within the banks of the waterways. A gravel bed-level crossing will be initially constructed to enable construction access to each abutment position. The bed-level crossing will be in place for approximately six months. The design of the bridge substructures has not yet been finalised (pending geotechnical borehole information) but is expected to comprise: • piles at each pier and abutment location to be installed by driving a steel liner to the required depth, with material within removed via auger • a prefabricated steel reinforcement cage lowered into the liner • liner filled with concrete via a concrete boom pump positioned on the bank of the watercourse. Piles at pier locations will be extended above ground level (as reinforced concrete columns) to a concrete headstock. There will not be any pile caps within the waterways. Piles at abutment locations are connected directly to the reinforced concrete abutment. The Bailey bridge superstructure will sit directly on the abutments and pier headstocks. It will be incrementally launched from one abutment to the opposite abutment and over piers.
Operation	As the bridge is single lane only, the approach road will include a pull up zone to allow traffic on the bridge right of way. The Yabba Creek bridge is required to be operational for the entire duration of the exploratory tunnelling. Should the Main Works proceed, this structure is expected to be retained, with an additional identical bridge constructed alongside to create dual lane access to cater for the increased level of traffic.
Decommissioning and rehabilitation	Bridge/s would be removed once the permanent access to the main works project area has been constructed. Decommissioning of the infrastructure will include: • disassembly and removal of the steel superstructure • demolition and removal of the concrete substructure above ground level, with foundation piles cut off at ground level and left in place • backfilling to natural surface levels • replanting of disturbed areas as required.

3.4.2 Sandy Creek bridge crossings

Aspect	Details
Purpose	To enable heavy and long vehicle access to the exploratory tunnel portal and explosive store.
Type/size	There are three crossings of Sandy Creek proposed. Two on the access track to the portal pad and one on the explosive store access track. A bridge will be installed at each waterway crossing to retain access to the portal and explosive store during high flow events. Features of the bridges include: • Bridge 1 (portal access track): dual span, approximately 64 m long in total • Bridge 2 (portal access track): dual span, approximately 73 m long in total • Bridge 3 (explosive store access track): dual span, approximately 55 m long in total • steel and concrete substructure (foundations) • steel superstructure • single lane, 4.5 m between kerbs

Aspect	Details
	• AS5100 design standard.
Location	These crossings are within unallocated state land associated with Sandy Creek, Lot 1723L37994, Lot 16LX1925 and Lot 3LX2754. The underside of all bridge superstructures has been set above the 1 in 100 flood level.
Installation	The bridge foundations have been positioned to minimise works required within the banks of the watercourse. A gravel bed-level crossing of the creek is likely to be constructed to enable construction access to each abutment position. Bridge foundations have not yet been designed, as access to undertake geotechnical boreholes is not yet available. Conceptually, the foundations will be bored piles which will be installed as follows: • piles at each pier and abutment location will be installed by driving a steel liner to the required depth, with material within then removed via auger • a prefabricated steel reinforcement cage will then be lowered into the liner • the liner will then be filled with concrete via a concrete boom pump positioned on the bank of the watercourse. Piles at pier locations will be extended above ground level (as reinforced concrete columns) to a concrete headstock. There will not be any pile caps within the waterway. Piles at abutment locations will be connected directly to the reinforced concrete abutment. Bridge superstructures will sit directly on the abutments and pier headstocks. Each superstructure will be incrementally launched from one abutment to the other opposite abutment (and over piers for bridges with more than one span).
Operation	As each bridge is single lane only, each approach road will include a pull up zone to allow traffic on the bridge right of way. The Sandy Creek bridges are required to be operational for the entire duration of the exploratory tunnelling (i.e. ~2 years).
Decommissioning and rehabilitation	Should the Main Works proceed, these structures are expected to be retained with an additional identical bridge constructed alongside each to create dual lane access to cater for the increased level of traffic. If the Main Works do not proceed, the track and bridges will be decommissioned. Decommissioning of the infrastructure will include: • disassembly and removal of the steel superstructure • demolition and removal of the concrete substructure above ground level, with foundation piles cut off at ground level and left in place • backfilling to natural surface levels • replanting of disturbed areas as required.

3.5 Spoil disposal areas

Aspect	Details
Purpose	To store excess material from the exploratory tunnels, Kingaham Creek bypass, and other civil works
Type/size	Two spoil disposal areas are proposed to store topsoil and excavated material. The tunnel spoil disposal area will be sized to store topsoil from the disposal area footprint and approximately 395,000 m^3 of excavated waste rock material from tunnel drilling that cannot be reused onsite. A second spoil disposal area (Kingaham) will be approximately 200 m by 40 m to allow for disposal of an estimated 95,000 m^3 from the construction of the Kingaham Creek bypass.

Aspect	Details
	The spoil areas are of sufficient size to allow for material to be segregated for contamination testing before being placed in the stockpiles and are proposed to be lined with a geogrid layer.
Location	The tunnel spoil stockpile is positioned to maintain a 50 m buffer to the nearest watercourse (Sandy Creek) on Lot 1723L37994, east of Borgan Road and south of the Yabba Creek and Sandy Creek confluence. The Kingaham spoil stockpile is located on Lot 1RP98849, south of Bella Creek Road. This is also positioned to maintain a 50 m buffer from the nearest watercourse (Kingaham Creek). Both spoil areas are above the 1% (Annual Exceedance Probability (AEP)) flood area.
Water management	For the tunnel spoil area, temporary stormwater management and erosion and sediment control will adhere to IECA best practice and be certified by an appropriately qualified Certified Professional in Erosion and Sediment Control. A longitudinal cutoff drain will be installed to minimise surface water runoff and erosion on the portal access track, which is adjacent to the tunnel spoil area. Internal drainage channels will flow directly to lined basins with secondary drains outside the spoil area confinement bunds. Water from the spoil pads will be directed to pump wells for pumping to the water treatment plant. An evaporation basin and an evaporator system may be established to support the management of runoff from the stockpile via erosion and sediment controls. For the Kingaham spoil area, erosion and sediment controls will be implemented in accordance with IECA best practice to ensure that spoil remains within its required bounds and does not enter Kingaham Creek via runoff. The spoil slopes will be battered and revegetated to minimise erosion or sediment transfer. Other additional measures may include sediment fencing, coir logs, catch drains, and rock check dams.
Installation	The spoil stockpile sites will be prepared to receive spoil material by performing ground clearance work, and minor ground levelling earthworks at the area, including the removal of a small number of trees. Topsoil will be progressively stripped from the footprint of the site and stockpiled in a long narrow windrow along the western edge of the spoil tunnel spoil site and the southern and eastern edge of the Kingaham spoil site, creating a bund that will contain the future spoil material. This topsoil will be reused in covering and revegetating the finished spoil stockpiles. Vegetation will also be stripped and stockpiled in the spoil disposal areas for future use where possible and not heavily covered in giant rat's tail grass (*Sporobolus pyramidalis*). There are no waterways or drainage lines in the proposed spoil areas, but erosion and sediment controls will be implemented to ensure that spoil placed in the disposal area remains within its required bounds and does not enter Sandy Creek, Yabba Creek or Kingaham Creek via runoff. These measures may include sediment fencing, coir logs, catch drains, and rock check dams.
Operation	The spoil areas will initially be accessed to stockpile topsoil and then be used to stockpile the excavated materials from the exploratory tunnels and bypass construction. The spoil stockpiles will be progressively installed. Testing and management for the tunnel spoil disposal area will be undertaken as follows: • forward probing will be undertaken during tunnelling with cores extracted for geotechnical testing before blasting to enable avoidance of acid-forming rock • stockpile material will be spot tested for acid sulphate soil (ASS), potential acid sulphate soil (PASS), potential acid forming rock, and contaminants • material found to contain contaminants will be treated appropriately for reuse, remediated and/or managed onsite or removed offsite and taken to a licensed facility for disposal • material found to be free of contaminants will be combined into the main spoil stockpile, with material shaped to blend into the natural contours of the surrounding land as far as possible

Aspect	Details
	• the material within the stockpile may be processed (crushed) and used for sheeting of access tracks around the site or used in rehabilitation activities • as material within the stockpile reaches the designed stockpile height, that area of the stockpile will be profiled and covered (e.g. topsoil and seeded with an approved grass seed) to mitigate dust pollution and run-off. The Kingaham spoil area is of sufficient size to allow for material to be segregated for contamination testing before being placed in the stockpiles. The stockpile design heights and form will be set to ensure the completed stockpiles are integrated as far as possible into the existing natural surface contours.
Decommissioning and rehabilitation	If the Main Works do not proceed, the revegetated stockpiles will be left in place. The spoil material will be shaped to blend into the natural contours of the surrounding land, vegetated, and kept away from existing drainage features. Queensland Hydro may also remove the spoil from the spoil disposal area to an area outside of the floodplain, or potentially pursue commercial sale of the material. If the Main Works component of the Borumba PHES Project proceeds, the material within the stockpiles will be assessed and, if suitable, reused. For example, the material may be processed (crushed) for sheeting of access tracks around the site. Any remaining spoil within the tunnel spoil disposal area would be inundated by the reservoir after the Borumba dam wall is constructed.

3.6 Explosive store and access track

Aspect	Details
Purpose	To store explosive materials used within the exploratory tunnel drill-and-blast operations and facilitate access to this storage.
Type/size	An approximately 130 m x 60 m space, including a fire break, has been set aside for the explosive storage facility.
Location	The explosives storage facility has been positioned to meet relevant Australian Standards and legislative requirements for safety and maintain a minimum separation distance of at least 612 m from other operational areas.
Installation	The explosive store pad and access track will be constructed after ground preparation and levelling works. The storage facilities will then be constructed on top of the pad provided (nominally 1.8 m fauna friendly chain wire perimeter fencing around one or more lockable sheds).
Operation	The explosive store will be in operation for the duration of the exploratory tunnelling operations and will be operated by an appropriately licenced contractor.
Decommissioning and rehabilitation	Should the Main Works not proceed, the explosive store will be completely removed upon completion of the exploratory tunnelling. This will entail removal of the above ground facilities in the first instance. Reshaping and back filling of the staging area will then be undertaken to return the excavated area to as close to the pre-disturbance landform as possible. Gravel surfacing will be scraped back and taken offsite or reused if a suitable beneficial reuse option is identified. The track would remain in place to allow access for the decommissioning works and would be removed once rehabilitation of the main staging area is complete. Once backfilled and returned to a pre-disturbance landform the area would be stabilised to minimise erosion and sedimentation in accordance with the best practice measures identified in *Best Practice Erosion and Sediment Control* (IECA, 2008). Revegetation of the area back to a pre-disturbance land use status (i.e. grazing pasture) would be undertaken. Revegetation would follow the processes outlined in Section 4.

3.7 Temporary water infrastructure

Aspect	Details
Purpose	To provide untreated (raw water) suitable for: • operation of drilling rigs associated with the geotechnical borehole drilling • operation of drilling rigs associated with the exploratory tunnelling • dust suppression and materials moisture conditioning associated with the surface civil works construction (roads and tracks). The infrastructure will be procured and delivered via a design and construct contract, meaning that final system details (size and installation details) are not yet fully known.
Location	Raw water will be sourced from Lake Borumba and/or groundwater ingress during the exploratory tunnelling. Water sourced from Lake Borumba will be supplied via temporary water infrastructure that includes pumps, pipelines, and storage tanks. It is proposed that the water pipeline will be predominately buried with some sections above ground around tank farms and at pump stations. The pipeline is designed to largely follow existing tracks from the upper section of Lake Borumba, then west to Borgan Road and south along Walkers Top Road. The water pipeline may also be extended to the portal pad and water management infrastructure within the footprint of the proposed portal access track.

Aspect	Details
Type/size	Features of the conceptual design include: • the pipeline is expected to be ~300 mm diameter • Tank Farm 1 will contain 4 x 150 kL storage tanks (600 kL of water storage) • Tank Farm 2 will contain 4 x 150 kL storage tanks (600 kL of water storage). • Walkers Top transfer pipeline pump stations (four stations) will contain 2 x 50 kL tanks (400 kL total)
Installation	Vegetation clearing is required for the installation of the pipeline and will be minimised as much as practicable and localised to the excavation required to bury the pipeline. Clearing will be required at the intake end as there is no clear path to the water, along the lower half of Walkers Top Road, and potentially at the lift stations/tank farms for pad formation. The pipeline will be shallow buried (approximately 400 mm cover to the ground surface, 600 mm cover under trafficked areas) to prevent 'snaking' of the pipeline from expansion and contraction due to temperature changes and protect the pipeline in the event of bushfire. The proposed design includes burying the pipeline beside Walkers Top Road from its start to near the intersection with the Dam Track. After the intersection with the Dam Track, where the terrain is flatter, the pipeline will be buried under the centre of Walkers Top Road. Two pipeline crossings of Yabba Creek will be installed by either drilling under the creek to eliminate any disturbance of the watercourse, or overhead via a temporary steel bridging structure. These construction methods are intended to reduce the disturbance to Yabba Creek and the surrounding area.
Operation	Raw water for the access track construction and management, and exploratory tunnel and geotechnical drilling will be extracted from the upper reaches of Lake Borumba using a submersible pump. The pump design will allow the pump to rise and fall in line with water level changes within the lake (e.g. inflow events). The pump will operate intermittently, triggered by low levels in the water storage tanks. It will be powered by a diesel generator situated on the adjacent riverbank above the 1% AEP flood event margin. The generator will contain a bunded diesel fuel tank with a capacity of approximately 500-1,000 litres (L). The pump will feed a set of water storage tanks near Borgan Road (Tank Farm 1) and the top of Walkers Top Road (Tank Farm 2) via pipeline. Tank Farm 1 will service the exploratory tunnelling and surface civil works. Tank Farm 2 will service the geotechnical drilling associated with the proposed upper reservoir. Water will be pumped up to Tank Farm 2 (approximately 400 m in elevation) via a series of 'lift stations' consisting of a header tank (single or dual 50 kL polyethylene tank) and pump. Each lift station will contain a diesel pump with a bunded day tank (~500 to 1,000 L) to enable operation for one to two days before refuelling. Each pump (extraction pump and lift station pumps) will incorporate telemetry to enable remote monitoring of pump performance and pump operation (i.e. remote start/stop). The pumps will operate at a low flow rate of ~2 to 5 L/sec. During large rainfall events, vehicle crossing of Yabba Creek to refuel the extraction pump generator will not be possible until creek flows subside. Where this occurs operation of the extraction pump in Lake Borumba will cease. Operation of lift station pumps would continue until the storage within their header tanks are exhausted, at which time onsite drilling operations would then cease until creek water levels subside and access to the extraction pump is reinstated. This infrastructure will be in operation for the duration of the Exploratory Works.
Decommissioning and rehabilitation	The temporary water infrastructure and contingency groundwater bores are required to be operational for the entire duration of the Exploratory Works. Should the Main Works proceed this water infrastructure is expected to be retained for use. If the Main Works does not proceed, decommissioning of the infrastructure will include: • removal of the extraction pump including steel tube liner from within Lake Borumba • removal of the extraction pump generator and each lift station pump • removal of all water storage tanks

Aspect	Details
	• excavation, removal of the shallow-buried water transfer pipeline and backfilling of the trench to natural ground levels • pipe cut-off and capping of each underground crossing of Yabba Creek • groundwater bore decommissioning (e.g. by capping or filling) • return of landform to pre-disturbance state • replanting of disturbed areas as required.

3.8 Resource recovery strategy

3.8.1 Beneficial reuse

Wherever possible, beneficial reuse of materials will be incorporated into decommissioning and rehabilitation works. This may include, but not be limited to the following:

- reuse of spoil rock to stabilise areas around and within the exploratory tunnels
- reuse of topsoils for land reformation and in rehabilitation works
- provision of spoil as fill to local landholders
- reuse of temporary waterway crossing infrastructure
- reuse of vegetation and other material to create artificial habitats, landscape or to stabilise area (e.g. mulch)
- sale of millable timber for commercial use
- reuse of any other suitable materials where possible, including reinforced steel, concrete structures such as culverts, cabling, etc.

3.8.2 Recycling

Decommissioning of the Exploratory Works Project will provide an opportunity to partially recover the cost of assets, which will be used to assist with funding of the decommissioning exercise. Where practicable, any component that can either be reused or salvaged will be available for resale or recycling.

3.8.3 Waste management

As an overarching principle, the waste minimisation hierarchy of avoid/reduce/reuse/recycle/dispose will be applied wherever possible to all decommissioning wastes. Any waste that is unable to be reused, reprocessed or recycled will be disposed of at a facility approved to receive that type of waste.

4. Rehabilitation methods

4.1 Rehabilitation objectives

The overall objective of the rehabilitation activities will be to return the site to as close to pre-construction condition as possible, with consideration of future land use (e.g. grazing land, access tracks for fire management). Specific rehabilitation outcomes will be detailed in the Rehabilitation Management Plan, which will be developed in consultation with the relevant agencies and stakeholders prior to the decommissioning process.

Specific performance outcomes indicating what would be regarded as successful rehabilitation will be developed as part of the Rehabilitation Management Plan. These may include, but would not be limited to:

- percentage of native vegetation cover
- percentage of stabilising cover crop growth
- survival percentage of new plantings
- control or absence of weeds
- evidence of successful erosion control
- natural regeneration of native plants.

4.2 Areas to be rehabilitated

The main areas where the decommissioning works would trigger rehabilitation works would be:

- the exploratory tunnels
- the spoil disposal areas
- temporary creek crossing structures
- temporary access tracks and pads for geotechnical works (including in the Conondale Resources Reserve).

Other areas which are associated with upgrades to existing tracks and roads are proposed to be stabilised but with minimal rehabilitation works or return to pre-upgrade condition.

4.3 Rehabilitation process description

A Rehabilitation Management Plan will be prepared for the rehabilitation of the Exploratory Works disturbance areas. This plan would set the guiding principles for the rehabilitation works and:

- identify priority areas
- outline desired outcomes for each area
- identify appropriate species for revegetation
- provide guidance on the minimum standards that would apply to contractors undertaking rehabilitation works
- set performance targets
- propose a maintenance and monitoring program
- include an adaptive management framework.

Basic steps in the rehabilitation process are likely to be as follows:

1. Where practicable, return all areas of temporary disturbance to their original profile or landform and stabilise.
2. Treat and control weed growth in these areas.
3. Once stabilised and weed free, assess the areas to confirm which of the following is the most appropriate rehabilitation practice to apply:
   - *management of retained vegetation:* this rehabilitation option applies when, after inspection, it is shown that the disturbance area has good regrowth or healthy retained vegetation in generally good condition with only minor weed control work or management required
   - *assisted generation:* areas that have the potential to naturally regenerate will be maintained and allowed to regenerate with only minimal maintenance (i.e. weed control):

- an initial 12-month period will be used to trial assisted regeneration in areas proposed for this treatment
- this time period will allow areas to demonstrate regenerative potential through a complete cycle of seasons before any planting is considered
- any areas within seed-fall of mature vegetation are expected to yield strong regeneration following weed control and are highly unlikely to require any supplementary planting
- if results show that this treatment is unlikely to satisfy performance criteria after 12 months, supplementary planting will be undertaken

– *revegetation:* this treatment will be applied to areas where there is limited potential for natural recruitment of vegetation, where rapid stabilisation of the landform is required, or in areas with specific environmental values that would benefit from enhancement (i.e. areas adjoining habitat for conservation significant species).

4. Once these initial stages of rehabilitation works have been completed the maintenance and monitoring period would begin.
5. The maintenance and monitoring would continue up to the point at which the agreed rehabilitation performance criteria have been met.

4.4 Monitoring program

To ensure the rehabilitation activities are successful and are meeting the rehabilitation performance objectives, periodic monitoring of the rehabilitated areas will be undertaken using methods to be agreed in the Rehabilitation Management Plan which is required to be prepared prior to commencement of any rehabilitation works. A suitably qualified environmental professional will be engaged at the time to conduct the monitoring program and any additional rehabilitation works that may be required. The Rehabilitation Management Plan will include an adaptive management process and provisions for corrective actions to ensure remediation measures are adequate to achieve the performance objectives.

4.5 Adaptive management process

The Exploratory Works Project will develop and implement an adaptive management process which will be used to guide assessment of the rehabilitation works against the performance objectives. A typical adaptive management process follows the 'plan, do, learn' cycle[1] illustrated in Figure 2. This process will be documented in detail in the Rehabilitation Management Plan.

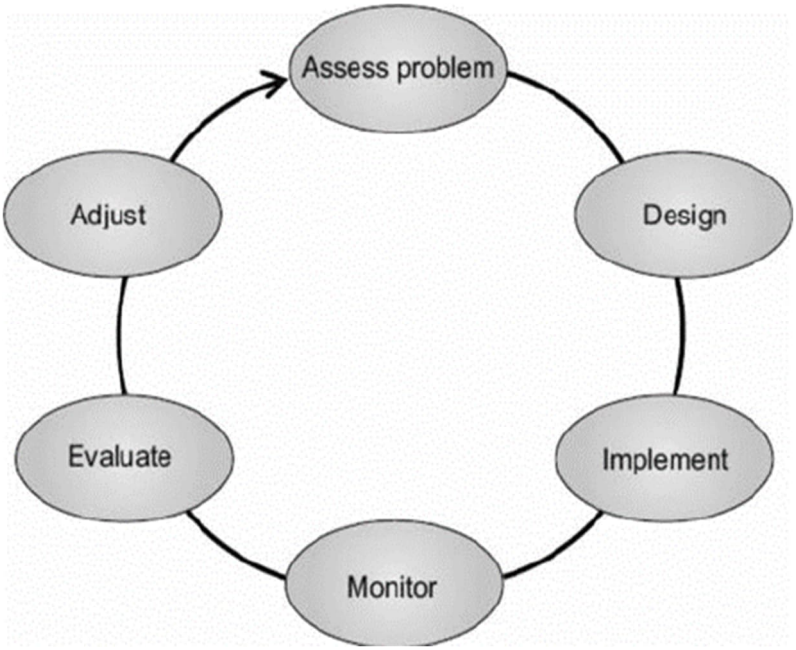

Figure 2: Adaptive management approach (plan, do, learn cycle)

[1] Source: US Department of the Interior

5. Timeframe for decommissioning and rehabilitation

The Exploratory Works are scheduled to be completed in mid-2030. Should the Borumba PHES Project proceed, decommissioning and rehabilitation works are expected to be completed in late 2030 (subject to commencement timing).

6. Financing decommissioning and rehabilitation

Queensland Hydro is owned and funded by the Queensland Government, and has the government's financial backing and support. The Queensland Government will fund any decommissioning and rehabilitation works required for the Exploratory Works Project.

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